

WEST**Freeform Search****Database:**

US Patents Full-Text Database
 US Pre-Grant Publication Full-Text Database
 JPO Abstracts Database
 EPO Abstracts Database
 Derwent World Patents Index
 IBM Technical Disclosure Bulletins

Term:

11 and (normaliz\$6) same (interpolation)

Display: **Documents in Display Format:** **Starting with Number**
Generate: ☐ Hit List ☒ Hit Count ☐ Side by Side ☐ Image

Search

Clear

Help

Logout

Interrupt

Main Menu

Show S Numbers

Edit S Numbers

Preferences

Cases

Search History
DATE: Tuesday, February 19, 2002 [Printable Copy](#) [Create Case](#)
SetName Queryside by
side*DB=USPT,PGPB,TDBD; PLUR=YES; OP=ADJ*L5 11 and (normaliz\$6) same (interpolation)L4 11 and (normaliz\$6) same (linear interpolation)L3 11 and (normaliz\$6) same (tetrahedron or tetrahedral)*DB=TDBD,PGPB,USPT; PLUR=YES; OP=ADJ*L2 11 and normaliz\$6

(CANON-KABUSHIKI-KAISHA..ASN. |

CANON-SALES-CO.-AND-SEMICONDUCTOR-PROCESS-LABORATORY-CO.-LTD..ASN

L1

| CANON-SALES-CO.-INC..ASN. | "CANONKABUSHIKI".ASN. | "CANON".ASN. |

CANON-KABUSHIKI-KAISHA..ASN. |

CANON-SALES-CO.-AND-SEMICONDUCTOR-PROCESS-LABORATORY-CO.-LTD..ASN

| CANON-SALES-CO.-INC..ASN. | "CANONDALE".ASN.)!

END OF SEARCH HISTORY

WEST

Generate Collection

Print

Search Results - Record(s) 1 through 10 of 11 returned.☐ 1. Document ID: US 6023351 A

L5: Entry 1 of 11

File: USPT

Feb 8, 2000

US-PAT-NO: 6023351

DOCUMENT-IDENTIFIER: US 6023351 A

TITLE: Regularized printer LUT with improved accuracy

DATE-ISSUED: February 8, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Newman; Todd	Palo Alto	CA		

US-CL-CURRENT: 358/524; 358/522, 358/523, 358/530

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KWC

☐ 2. Document ID: US 6021388 A

L5: Entry 2 of 11

File: USPT

Feb 1, 2000

US-PAT-NO: 6021388

DOCUMENT-IDENTIFIER: US 6021388 A

TITLE: Speech synthesis apparatus and method

DATE-ISSUED: February 1, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Otsuka; Mitsuru	Iwatsuki			JPX
Ohora; Yasunori	Yokohama			JPX
Aso; Takashi	Yokohama			JPX
Okutani; Yasuo	Yokohama			JPX

US-CL-CURRENT: 704/268; 704/269

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KWC

☐ 3. Document ID: US 5809181 A

L5: Entry 3 of 11

File: USPT

Sep 15, 1998

US-PAT-NO: 5809181
DOCUMENT-IDENTIFIER: US 5809181 A

TITLE: Color conversion apparatus

DATE-ISSUED: September 15, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Metcalfe; James Robert	Collaroo Plateau			AUX

US-CL-CURRENT: 382/276; 358/523, 358/525, 382/167

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMIC
Draw Desc	Image									

☐ 4. Document ID: US 5745650 A

L5: Entry 4 of 11

File: USPT

Apr 28, 1998

US-PAT-NO: 5745650
DOCUMENT-IDENTIFIER: US 5745650 A

TITLE: Speech synthesis apparatus and method for synthesizing speech from a character series comprising a text and pitch information

DATE-ISSUED: April 28, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Otsuka; Mitsuru	Yokohama			JPX
Ohora; Yasunori	Yokohama			JPX
Aso; Takashi	Yokohama			JPX
Fukada; Toshiaki	Yokohama			JPX

US-CL-CURRENT: 704/260; 704/201, 704/205, 704/206, 704/207, 704/211, 704/258, 704/264, 704/267, 704/268

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMIC
Draw Desc	Image									

☐ 5. Document ID: US 5719789 A

L5: Entry 5 of 11

File: USPT

Feb 17, 1998

US-PAT-NO: 5719789
DOCUMENT-IDENTIFIER: US 5719789 A

TITLE: Method of and apparatus for detecting an amount of displacement

DATE-ISSUED: February 17, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kawamata; Naoki	Utsunomiya			JPX

US-CL-CURRENT: 702/189; 356/499

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWIC
Draw Desc	Image									

☐ 6. Document ID: US 5432891 A

L5: Entry 6 of 11

File: USPT

Jul 11, 1995

US-PAT-NO: 5432891

DOCUMENT-IDENTIFIER: US 5432891 A

TITLE: Image processing method and apparatus

DATE-ISSUED: July 11, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Onodera; Ken	Yokohama			JPX

US-CL-CURRENT: 358/1.15; 358/1.16

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWIC
Draw Desc	Image									

☐ 7. Document ID: US 5351137 A

L5: Entry 7 of 11

File: USPT

Sep 27, 1994

US-PAT-NO: 5351137

DOCUMENT-IDENTIFIER: US 5351137 A

TITLE: Pixel density converting apparatus

DATE-ISSUED: September 27, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kato; Masami	Sagamihara			JPX
Kato; Takao	Yokohama			JPX
Hashimoto; Yasunori	Yokohama			JPX

US-CL-CURRENT: 358/457; 358/456

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWIC
Draw Desc	Image									

☐ 8. Document ID: US 5319471 A

L5: Entry 8 of 11

File: USPT

Jun 7, 1994

US-PAT-NO: 5319471

DOCUMENT-IDENTIFIER: US 5319471 A

TITLE: Image transmitting apparatus having improved coding of multi-valued image data

DATE-ISSUED: June 7, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Takei; Masahiro	Tokyo			JPX
Takayama; Tadashi	Tokyo			JPX
Horii; Hiroyuki	Tokyo			JPX
Kimura; Norio	Tokyo			JPX

US-CL-CURRENT: 358/451; 358/408, 358/426

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KMC

☐ 9. Document ID: US 5289293 A

L5: Entry 9 of 11

File: USPT

Feb 22, 1994

US-PAT-NO: 5289293

DOCUMENT-IDENTIFIER: US 5289293 A

TITLE: Pixel density conversion and processing

DATE-ISSUED: February 22, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kato; Masami	Sagamihara			JPX
Kato; Takao	Yokohama			JPX
Hashimoto; Yasunori	Yokohama			JPX

US-CL-CURRENT: 358/457; 358/456

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KMC

☐ 10. Document ID: US 5220629 A

L5: Entry 10 of 11

File: USPT

Jun 15, 1993

US-PAT-NO: 5220629

DOCUMENT-IDENTIFIER: US 5220629 A

TITLE: Speech synthesis apparatus and method

DATE-ISSUED: June 15, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kosaka; Tetsuo	Yokohama			JPX
Sakurai; Atsushi	Yokohama			JPX
Tamura; Junichi	Tokyo			JPX
Ohora; Yasunori	Tokyo			JPX
Fujita; Takeshi	Yokohama			JPX
Aso; Takashi	Yokohama			JPX
Kawasaki; Katsuhiko	Machida			JPX

US-CL-CURRENT: 704/260

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Drawn Desc	Image								

KWD

[Generate Collection](#)[Print](#)

Terms	Documents
11 and (normaliz\$6) same (interpolation)	11

Display Format:[Change Format](#)[Previous Page](#)[Next Page](#)

WEST[Generate Collection](#)[Print](#)**Search Results - Record(s) 11 through 11 of 11 returned.**☐ 11. Document ID: US 5202670 A

L5: Entry 11 of 11

File: USPT

Apr 13, 1993

US-PAT-NO: 5202670

DOCUMENT-IDENTIFIER: US 5202670 A

TITLE: Image processing apparatus

DATE-ISSUED: April 13, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Oha; Shinichi	Tokyo			JPX

US-CL-CURRENT: 345/671; 345/606, 358/451, 382/299

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	RWC
Draw Desc	Image									

[Generate Collection](#)[Print](#)

Terms	Documents
11 and (normaliz\$6) same (interpolation)	11

Display Format:[Change Format](#)[Previous Page](#)[Next Page](#)

IEEE HOME | SEARCH IEEE | SHOP | WEB ACCOUNT | CONTACT IEEE

Membership Publications/Services Standards Conferences Careers/Jobs

IEEE Xplore™

RELEASE 1.3

Help FAQ Terms IEEE Peer Quick Links Review

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 Print FormatYour search matched **4** of **748173** documents.Results are shown **25** to a page, sorted by **publication year** in **descending** order.

You may refine your search by editing the current search expression or entering a new one the te

Then click **Search Again**.**Results:**Journal or Magazine = **JNL** Conference = **CNF** Standard = **STD****1 Fuzzy approximation via grid point sampling and singular value decomposition***Yeung Yam*

Systems, Man and Cybernetics, Part B, IEEE Transactions on , Volume: 27 Iss Dec. 1997

Page(s): 933 -951

[\[Abstract\]](#) [\[PDF Full-Text \(936 KB\)\]](#) **JNL****2 Singular value-based identification of fuzzy system***Yeung Yam*

Decision and Control, 1997., Proceedings of the 36th IEEE Conference on , Vo 1997

Page(s): 3341 -3346 vol.4

[\[Abstract\]](#) [\[PDF Full-Text \(480 KB\)\]](#) **CNF****3 A comparison of rotation-based methods for iterative reconstruction algorithms***Di Bella, E.V.R.; Barclay, A.B.; Eisner, R.L.; Schafer, R.W.*

Nuclear Science, IEEE Transactions on , Volume: 43 Issue: 6 Part: 2 , Dec. 19

Page(s): 3370 -3376

[\[Abstract\]](#) [\[PDF Full-Text \(148 KB\)\]](#) **JNL****4 Comparison of rotation-based methods for iterative reconstruction algorithms***Di Bella, E.V.R.; Barclay, A.B.; Eisner, R.L.; Schafer, R.W.*

Di Bella, E.V.R.; Barclay, A.B.; Eisner, R.L.; Schafer, R.W.

Nuclear Science Symposium and Medical Imaging Conference Record, 1995.,

, Volume: 2 , 1995

Page(s): 1146 -1150 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(528 KB\)\]](#) **CNF**

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#)
[Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2002 IEEE — All rights reserved

WEST[Generate Collection](#)[Print](#)**Search Results - Record(s) 1 through 1 of 1 returned.**☒ 1. Document ID: US 6295137 B1

L2: Entry 1 of 1

File: USPT

Sep 25, 2001

US-PAT-NO: 6295137

DOCUMENT-IDENTIFIER: US 6295137 B1

TITLE: Method of color correction using multi-level halftoning

DATE-ISSUED: September 25, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Balasubramanian; Thyagarajan	Webster	NY		

US-CL-CURRENT: 358/1.9; 358/456, 358/518, 358/523, 358/534

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWC
Drawn Desc	Image										

[Generate Collection](#)[Print](#)

Terms	Documents
tetrahedral interpolation same normaliz\$6	1

Display Format:[CIT](#)[Change Format](#)[Previous Page](#)[Next Page](#)

L Number	Hits	Search Text	DB	Time stamp
1	471	(data conversion) near (normalization)	USPAT	2002/02/19 17:06
3	0	(data conversion) near (normalization) near (large number\$1 or big number\$1 or huge number\$1) near (integer\$1)	USPAT	2002/02/19 17:07
2	2	(data conversion) near (normalization) near (large number or big number or huge number)	USPAT	2002/02/19 17:10
4	0	(data conversion) near (normalization) near (integer\$1)	USPAT	2002/02/19 17:11
5	12	(normalization) near (integer\$1)	USPAT	2002/02/19 17:23
6	69	(normaliz\$5) near (integer\$1)	USPAT	2002/02/19 17:23
7	3	(normaliz\$5) near (integer\$1) near (data conversion)	USPAT	2002/02/19 17:25
8	20	(normaliz\$5) near (operation) near (data conversion)	USPAT	2002/02/19 18:02
9	475096	tetrahedral linear interpolation	USPAT	2002/02/19 18:03
11	1	(tetrahedral linear interpolation) near (normalization) near (operation\$1)	USPAT	2002/02/19 18:04
10	60	(tetrahedral linear interpolation) near (normalization)	USPAT	2002/02/19 18:23
12	0	(tetrahedral linear interpolation) near (normalization) near (multiple large integer\$1)	USPAT	2002/02/19 18:24
13	928	(normalization) same (power of ((data conversion) near (normalization) near (large number or big number or huge number)))	USPAT	2002/02/19 18:24
14	0	(normalization) same (power of ((data conversion) near (normalization) near (large number or big number or huge number))) same (tetrahedral or tetrahedron)	USPAT	2002/02/19 18:25
15	89	(normalization) same (power of ((data conversion) near (normalization) near (large number or big number or huge number))) same (linear interpolation)	USPAT	2002/02/19 18:25
16	100	(normalization) same (power of ((data conversion) near (normalization) near (large number or big number or huge number))) same (linear interpolation)	USPAT	2002/02/19 18:25
17	11	(normalization) same (power of ((data conversion) near (normalization) near (large number or big number or huge number))) same (linear interpolation) same (grid point\$1)	USPAT	2002/02/19 18:26

	U	1	Document ID	Issue Date	Pages
1	<input type="checkbox"/>	<input type="checkbox"/>	US 6115338 A	20000905	82
2	<input type="checkbox"/>	<input type="checkbox"/>	US 6072761 A	20000606	53
3	<input type="checkbox"/>	<input type="checkbox"/>	US 6021388 A	20000201	53
4	<input type="checkbox"/>	<input type="checkbox"/>	US 5828705 A	19981027	14
5	<input type="checkbox"/>	<input type="checkbox"/>	US 5825579 A	19981020	23
6	<input type="checkbox"/>	<input type="checkbox"/>	US 5732055 A	19980324	80
7	<input type="checkbox"/>	<input type="checkbox"/>	US 5684920 A	19971104	34
8	<input type="checkbox"/>	<input type="checkbox"/>	US 5248997 A	19930928	7
9	<input type="checkbox"/>	<input type="checkbox"/>	US 4905204 A	19900227	21
10	<input type="checkbox"/>	<input type="checkbox"/>	US 4882713 A	19891121	21
11	<input type="checkbox"/>	<input type="checkbox"/>	US 4719585 A	19880112	14

	Title	Current OR	Current XRef
1	Optical storage apparatus	369/47.52	369/116 ; 369/47.53
2	Optical storage apparatus having an automatic laser power control with light emission fine control	369/116	369/53.26 ; 369/53.27
3	Speech synthesis apparatus and method	704/268	704/269
4	Carrier tracking technique and apparatus having automatic flywheel/tracking/reacqui- sition control and extended signal to noise ratio	375/326	375/316 ; 375/322 ; 375/324 ; 375/354 ; 375/355
5	Disk drive servo sensing gain normalization and linearization	360/77.08	360/77.02
6	Optical storage apparatus	369/53.26	369/116
7	Acoustic signal transform coding method and decoding method having a high efficiency envelope flattening method therein	704/203	704/201 ; 704/204 ; 704/219 ; 704/220 ; 704/258 ; 704/262
8	Facet reflectance correction in a polygon scanner	347/261	359/217
9	Method of weighting a trace stack from a plurality of input traces	367/62	367/38 ; 702/17
10	Method for noise suppression in the stacking of seismic traces	367/47	367/62 ; 702/17
11	Dividing cubes system and method for the display of surface structures contained within the interior region of a solid body	345/424	345/419 ; 345/426 ; 600/425

	Retrieval Classif	Inventor	S	C	P	2	3	4	5
1		Masaki, Takashi , et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2		Tani, Hiroshi	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3		Otsuka, Mitsuru , et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4		Kroeger, Brian W. , et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		Cheung, Wayne Leung , et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		Masaki, Takashi , et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		Iwakami, Naoki , et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		Summers, Drew D.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		Hughes, Phillip A.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10		Hughes, Philip A.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11		Cline, Harvey E. , et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

WEST[Generate Collection](#)[Print](#)**Search Results - Record(s) 1 through 10 of 11 returned.**☒ **1. Document ID: US 6023351 A**

L5: Entry 1 of 11

File: USPT

Feb 8, 2000

US-PAT-NO: 6023351

DOCUMENT-IDENTIFIER: US 6023351 A

TITLE: Regularized printer LUT with improved accuracy

DATE-ISSUED: February 8, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Newman; Todd	Palo Alto	CA		

US-CL-CURRENT: 358/524; 358/522, 358/523, 358/530

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC
Draw Desc	Image										

☒ **2. Document ID: US 6021388 A**

L5: Entry 2 of 11

File: USPT

Feb 1, 2000

US-PAT-NO: 6021388

DOCUMENT-IDENTIFIER: US 6021388 A

TITLE: Speech synthesis apparatus and method

DATE-ISSUED: February 1, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Otsuka; Mitsuru	Iwatsuki			JPX
Ohora; Yasunori	Yokohama			JPX
Aso; Takashi	Yokohama			JPX
Okutani; Yasuo	Yokohama			JPX

US-CL-CURRENT: 704/268; 704/269

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC
Draw Desc	Image										

☒ **3. Document ID: US 5809181 A**

L5: Entry 3 of 11

File: USPT

Sep 15, 1998

US-PAT-NO: 5809181
DOCUMENT-IDENTIFIER: US 5809181 A

TITLE: Color conversion apparatus

DATE-ISSUED: September 15, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Metcalfe; James Robert	Collaroo Plateau			AUX

US-CL-CURRENT: 382/276; 358/523, 358/525, 382/167

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC
Draw Desc	Image										

☒ 4. Document ID: US 5745650 A

L5: Entry 4 of 11

File: USPT

Apr 28, 1998

US-PAT-NO: 5745650
DOCUMENT-IDENTIFIER: US 5745650 A

TITLE: Speech synthesis apparatus and method for synthesizing speech from a character series comprising a text and pitch information

DATE-ISSUED: April 28, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Otsuka; Mitsuru	Yokohama			JPX
Ohora; Yasunori	Yokohama			JPX
Aso; Takashi	Yokohama			JPX
Fukada; Toshiaki	Yokohama			JPX

US-CL-CURRENT: 704/260; 704/201, 704/205, 704/206, 704/207, 704/211, 704/258, 704/264, 704/267, 704/268

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMC
Draw Desc	Image									

☒ 5. Document ID: US 5719789 A

L5: Entry 5 of 11

File: USPT

Feb 17, 1998

US-PAT-NO: 5719789
DOCUMENT-IDENTIFIER: US 5719789 A

TITLE: Method of and apparatus for detecting an amount of displacement

DATE-ISSUED: February 17, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kawamata; Naoki	Utsunomiya			JPX

US-CL-CURRENT: 702/189; 356/499

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWIC
Draw Desc	Image									

☒ 6. Document ID: US 5432891 A

L5: Entry 6 of 11

File: USPT

Jul 11, 1995

US-PAT-NO: 5432891

DOCUMENT-IDENTIFIER: US 5432891 A

TITLE: Image processing method and apparatus

DATE-ISSUED: July 11, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Onodera; Ken	Yokohama			JPX

US-CL-CURRENT: 358/1.15; 358/1.16

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWIC
Draw Desc	Image									

☒ 7. Document ID: US 5351137 A

L5: Entry 7 of 11

File: USPT

Sep 27, 1994

US-PAT-NO: 5351137

DOCUMENT-IDENTIFIER: US 5351137 A

TITLE: Pixel density converting apparatus

DATE-ISSUED: September 27, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kato; Masami	Sagamihara			JPX
Kato; Takao	Yokohama			JPX
Hashimoto; Yasunori	Yokohama			JPX

US-CL-CURRENT: 358/457; 358/456

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWIC
Draw Desc	Image									

☒ 8. Document ID: US 5319471 A

L5: Entry 8 of 11

File: USPT

Jun 7, 1994

US-PAT-NO: 5319471

DOCUMENT-IDENTIFIER: US 5319471 A

TITLE: Image transmitting apparatus having improved coding of multi-valued image data

DATE-ISSUED: June 7, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Takei; Masahiro	Tokyo			JPX
Takayama; Tadashi	Tokyo			JPX
Horii; Hiroyuki	Tokyo			JPX
Kimura; Norio	Tokyo			JPX

US-CL-CURRENT: 358/451; 358/408, 358/426

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KVMC
Draw Desc	Image									

☒ 9. Document ID: US 5289293 A

L5: Entry 9 of 11

File: USPT

Feb 22, 1994

US-PAT-NO: 5289293

DOCUMENT-IDENTIFIER: US 5289293 A

TITLE: Pixel density conversion and processing

DATE-ISSUED: February 22, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kato; Masami	Sagamihara			JPX
Kato; Takao	Yokohama			JPX
Hashimoto; Yasunori	Yokohama			JPX

US-CL-CURRENT: 358/457; 358/456

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KVMC
Draw Desc	Image									

☒ 10. Document ID: US 5220629 A

L5: Entry 10 of 11

File: USPT

Jun 15, 1993

US-PAT-NO: 5220629

DOCUMENT-IDENTIFIER: US 5220629 A

TITLE: Speech synthesis apparatus and method

DATE-ISSUED: June 15, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kosaka; Tetsuo	Yokohama			JPX
Sakurai; Atsushi	Yokohama			JPX
Tamura; Junichi	Tokyo			JPX
Ohora; Yasunori	Tokyo			JPX
Fujita; Takeshi	Yokohama			JPX
Aso; Takashi	Yokohama			JPX
Kawasaki; Katsuhiko	Machida			JPX

US-CL-CURRENT: 704/260

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KMC

[Generate Collection](#)[Print](#)

Terms	Documents
11 and (normaliz\$6) same (interpolation)	11

Display Format:[Change Format](#)[Previous Page](#)[Next Page](#)

WEST[Generate Collection](#)[Print](#)**Search Results - Record(s) 11 through 11 of 11 returned.**☒ **11. Document ID: US 5202670 A**

L5: Entry 11 of 11

File: USPT

Apr 13, 1993

US-PAT-NO: 5202670

DOCUMENT-IDENTIFIER: US 5202670 A

TITLE: Image processing apparatus

DATE-ISSUED: April 13, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Oha; Shinichi	Tokyo			JPX

US-CL-CURRENT: [345/671](#); [345/606](#), [358/451](#), [382/299](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

[KMC](#)[Generate Collection](#)[Print](#)

Terms	Documents
11 and (normaliz\$6) same (interpolation)	11

Display Format:[Change Format](#)[Previous Page](#)[Next Page](#)

WEST**Freeform Search**

Database:

US Patents Full-Text Database
US Pre-Grant Publication Full-Text Database
JPO Abstracts Database
EPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Term:

tetrahedral interpolation same normaliz\$6

Display: Documents in Display Format: Starting with Number Generate: ☐ Hit List ☒ Hit Count ☐ Side by Side ☐ Image

Search

Clear

Help

Logout

Interrupt

Main Menu

Show S Numbers

Edit S Numbers

Preferences

Cases

Search HistoryDATE: Tuesday, February 19, 2002 [Printable Copy](#) [Create Case](#)Set Name Query

side by side

Hit Count Set Name

result set

DB=USPT,PGPB,TDBD; PLUR=YES; OP=ADJ

L2 tetrahedral interpolation same normaliz\$61 L2L1 tetrahedral interpolation78 L1

END OF SEARCH HISTORY

IEEE HOME | SEARCH IEEE | SHOP | WEB ACCOUNT | CONTACT IEEE

Membership Publications/Services Standards Conferences Careers/Jobs

IEEE Xplore™
RELEASE 1.3[Help](#) [FAQ](#) [Terms](#) [IEEE Peer](#) [Quick Links](#) [Review](#)

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 Print FormatYour search matched **32** of **748219** documents.Results are shown **15** to a page, sorted by **publication year** in **descending** order.

You may refine your search by editing the current search expression or entering a new one the te

Then click **Search Again**.**Results:**Journal or Magazine = **JNL** Conference = **CNF** Standard = **STD**

1 Iterative soft decoded partial response channels for hybrid magneto recording*Hongwei Song; Jingfeng Liu; Kumar, B.V.K.V.; Kurtas, E.*

Magnetics, IEEE Transactions on , Volume: 37 Issue: 2 Part: 1 , March 2001

Page(s): 676 -681

[\[Abstract\]](#) [\[PDF Full-Text \(144 KB\)\]](#) **JNL**

2 Radiometric normalization, compositing, and quality control for sate resolution image mosaics over large areas*Yong Du; Cihlar, J.; Beaubien, J.; Latifovic, R.*

Geoscience and Remote Sensing, IEEE Transactions on , Volume: 39 Issue: 3 2001

Page(s): 623 -634

[\[Abstract\]](#) [\[PDF Full-Text \(476 KB\)\]](#) **JNL**

3 Phase-jitter dynamics of digital phase-locked loops: Part II*Teplinsky, A.; Feely, O.*

Circuits and Systems I: Fundamental Theory and Applications, IEEE Transacti Volume: 47 Issue: 4 , April 2000

Page(s): 458 -473

[\[Abstract\]](#) [\[PDF Full-Text \(800 KB\)\]](#) **JNL**

4 An entropy theorem for computing the capacity of weakly (d,k)-con sequences

Janssen, A.J.E.M.; Schouhamer Immink, K.A.

Information Theory, IEEE Transactions on , Volume: 46 Issue: 3 , May 2000

Page(s): 1034 -1038

[\[Abstract\]](#) [\[PDF Full-Text \(192 KB\)\]](#) [JNL](#)

5 Interpolation/decimation scheme applied to size normalization of ch images

de Oliveira, J.J., Jr.; Veloso, L.R.; de Carvalho, J.M.

Pattern Recognition, 2000. Proceedings. 15th International Conference on , Vo 2000

Page(s): 577 -580 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(280 KB\)\]](#) [CNF](#)

6 Design and properties of step-like weighting windows

Lukin, V.V.; Saramaki, T.

Circuits and Systems, 2000. Proceedings. ISCAS 2000 Geneva. The 2000 IEEE International Symposium on , Volume: 1 , 2000

Page(s): 108 -111 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(288 KB\)\]](#) [CNF](#)

7 Simulating exponential normalization with weighted k-tournaments

Julstrom, B.A.; Robinson, D.H.

Evolutionary Computation, 2000. Proceedings of the 2000 Congress on , Volum 2000

Page(s): 227 -231 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(372 KB\)\]](#) [CNF](#)

8 Capacity of weakly (d,k)-constrained sequences

Immink, K.A.S.; Janssen, A.J.E.M.

International Symposium on Information Theory, 2000. Proceedings. IEEE , 2

Page(s): 144

[\[Abstract\]](#) [\[PDF Full-Text \(80 KB\)\]](#) [CNF](#)

9 Strict ordering on discrete images and applications

Coltuc, D.; Bolon, P.

Image Processing, 1999. ICIP 99. Proceedings. 1999 International Conference Volume: 3 , 1999

Page(s): 150 -153 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(344 KB\)\]](#) **CNF**

10 Design of hybrid filter banks for analog/digital conversion

Velazquez, S.R.; Nguyen, T.Q.; Broadstone, S.R.

Signal Processing, IEEE Transactions on , Volume: 46 Issue: 4 , April 1998

Page(s): 956 -967

[\[Abstract\]](#) [\[PDF Full-Text \(336 KB\)\]](#) **JNL**

11 Recognition of printed multifont alphanumeric characters using Wa transform function

Durk Won Park

Signal Processing Proceedings, 1998. ICSP '98. 1998 Fourth International Conference on , Volume: 2 , 1998

Page(s): 1233 -1236 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(332 KB\)\]](#) **CNF**

12 Transformation of Shannon's sampling points into Daubechies' wavelet sampling points

Zhang Jiankang; Bao Zheng; Jiao Licheng

Signal Processing Proceedings, 1998. ICSP '98. 1998 Fourth International Conference on , 1998

Page(s): 305 -308 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(236 KB\)\]](#) **CNF**

13 Reversible discrete cosine transform

Komatsu, K.; Sezaki, K.

Acoustics, Speech and Signal Processing, 1998. Proceedings of the 1998 IEEE International Conference on , Volume: 3 , 1998

Page(s): 1769 -1772 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(240 KB\)\]](#) **CNF**

14 Recognition of printed multi-font alphanumeric characters of multiscale times/3 templates

Durk Won Park; Jong Won Park

Signal Processing, 1996., 3rd International Conference on , Volume: 2 , 1996

Page(s): 1320 -1323 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(344 KB\)\]](#) **CNF**

15 Adaptive algorithms for joint time delay estimation and IIR filterin*Teng Joon Lim; Macleod, M.D.*

Signal Processing, IEEE Transactions on , Volume: 43 Issue: 4 , April 1995

Page(s): 841 -851

[\[Abstract\]](#) [\[PDF Full-Text \(928 KB\)\]](#) [JNL](#)[1](#) [2](#) [3](#) [\[Next\]](#)

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#)
[Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2002 IEEE — All rights reserved

IEEE HOME | SEARCH IEEE | SHOP | WEB ACCOUNT | CONTACT IEEE

Membership Publications/Services Standards Conferences Careers/Jobs

IEEE Xplore™
RELEASE 1.3[Help](#) [FAQ](#) [Terms](#) [IEEE Peer](#) [Quick Links](#)[Review](#)

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 Print FormatYour search matched **32** of **749320** documents.Results are shown **15** to a page, sorted by **publication year** in **descending** order.

You may refine your search by editing the current search expression or entering a new one the te

Then click **Search Again**.**Results:**Journal or Magazine = **JNL** Conference = **CNF** Standard = **STD****16 Generalized multiway branch unit for VLIW microprocessors***Soo-Mook Moon; Carson, S.D.*

Parallel and Distributed Systems, IEEE Transactions on , Volume: 6 Issue: 8 , 1995

Page(s): 850 -862

[\[Abstract\]](#) [\[PDF Full-Text \(1068 KB\)\]](#) **JNL****17 Minimum number of adders for implementing a multiplier and its ap to the design of multiplierless digital filters***Dongning Li*

Circuits and Systems II: Analog and Digital Signal Processing, IEEE Transacti Volume: 42 Issue: 7 , July 1995

Page(s): 453 -460

[\[Abstract\]](#) [\[PDF Full-Text \(680 KB\)\]](#) **JNL****18 Normalization and extensionality***Piperno, A.*

Logic in Computer Science, 1995. LICS '95. Proceedings., Tenth Annual IEEE Symposium on , 1995

Page(s): 300 -310

[\[Abstract\]](#) [\[PDF Full-Text \(708 KB\)\]](#) **CNF****19 Trellis-coded continuous-phase frequency-shift keying with ring convolutional codes***Yang, R.H.-H.; Taylor, D.P.*

Information Theory, IEEE Transactions on , Volume: 40 Issue: 4 , July 1994
Page(s): 1057 -1067

[\[Abstract\]](#) [\[PDF Full-Text \(804 KB\)\]](#) **JNL**

20 Recurrent Neural Networks And Fibonacci Numeration System

Yacoub, M.; Saoudi, A.

Neural Networks, 1993. IJCNN '93-Nagoya. Proceedings of 1993 International Conference on , Volume: 3

Page(s): 2331 -2334

[\[Abstract\]](#) [\[PDF Full-Text \(216 KB\)\]](#) **CNF**

21 Decidability of the strict reachability problem for TPN's with rational durations

Ruiz, V.V.; De Frutos Escrig, D.; Gomez, F.C.

Petri Nets and Performance Models, 1993. Proceedings., 5th International Workshop, 1993

Page(s): 56 -65

[\[Abstract\]](#) [\[PDF Full-Text \(824 KB\)\]](#) **CNF**

22 A Polynomial-time Algorithm For Designing Digital Filters With Power-of-two Coefficients

Dongning Li; Jianjian Song; Yong Ching Lim

Circuits and Systems, 1993., ISCAS '93, 1993 IEEE International Symposium 1993

Page(s): 84 -87

[\[Abstract\]](#) [\[PDF Full-Text \(0 KB\)\]](#) **CNF**

23 A polynomial-time algorithm for designing digital filters with power coefficients

Li, D.; Song, J.; Lim, Y.C.

Circuits and Systems, 1993., ISCAS '93, 1993 IEEE International Symposium 1993

Page(s): 84 -87 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(352 KB\)\]](#) **CNF**

24 Bit-level systolic carry-save array division

Dawid, H.; Fettweis, G.

Global Telecommunications Conference, 1992. Conference Record., GLOBECO Communication for Global Users., IEEE , 1992

Page(s): 484 -488 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(564 KB\)\]](#) **CNF**

25 Fibonacci representations and finite automata

Frougny, C.

Information Theory, IEEE Transactions on , Volume: 37 Issue: 2 , March 1991

Page(s): 393 -399

[\[Abstract\]](#) [\[PDF Full-Text \(580 KB\)\]](#) **JNL**

26 A redundant binary Euclidean GCD algorithm

Parikh, S.N.; Matula, D.W.

Computer Arithmetic, 1991. Proceedings., 10th IEEE Symposium on , 1991

Page(s): 220 -225

[\[Abstract\]](#) [\[PDF Full-Text \(348 KB\)\]](#) **CNF**

27 Representation of numbers in nonclassical numeration systems

Frougny, C.

Computer Arithmetic, 1991. Proceedings., 10th IEEE Symposium on , 1991

Page(s): 17 -21

[\[Abstract\]](#) [\[PDF Full-Text \(400 KB\)\]](#) **CNF**

28 A systematic method for division with high average bit skipping

Mandelbaum, D.M.

Computers, IEEE Transactions on , Volume: 39 Issue: 1 , Jan. 1990

Page(s): 127 -130

[\[Abstract\]](#) [\[PDF Full-Text \(376 KB\)\]](#) **JNL**

29 Reduced-rank least squares channel estimation

Barton, M.; Tufts, D.W.

Acoustics, Speech and Signal Processing [see also IEEE Transactions on Signal Processing], IEEE Transactions on , Volume: 38 Issue: 8 , Aug. 1990

Page(s): 1403 -1410

[\[Abstract\]](#) [\[PDF Full-Text \(708 KB\)\]](#) **JNL**

30 Some inference rules for integer arithmetic for verification of flowc programs on integers

Sarkar, D.C.; De Sarkar, S.C.

Software Engineering, IEEE Transactions on , Volume: 15 Issue: 1 , Jan. 1989

Page(s): 1 -9

[\[Abstract\]](#) [\[PDF Full-Text \(660 KB\)\]](#) [JNL](#)

[\[Prev\]](#) [1](#) [2](#) [3](#) [\[Next\]](#)

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#)
[Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2002 IEEE — All rights reserved

[IEEE HOME](#) | [SEARCH IEEE](#) | [SHOP](#) | [WEB ACCOUNT](#) | [CONTACT IEEE](#)[Membership](#) [Publications/Services](#) [Standards](#) [Conferences](#) [Careers/Jobs](#)**IEEE Xplore™**
RELEASE 1.3[Help](#) [FAQ](#) [Terms](#) [IEEE Peer](#) [Quick Links](#)>> [Search](#)[Review](#)

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 [Print Format](#)Your search matched **32** of **749320** documents.Results are shown **15** to a page, sorted by **publication year** in **descending** order.

You may refine your search by editing the current search expression or entering a new one the te

Then click **Search Again**.**Results:**Journal or Magazine = **JNL** Conference = **CNF** Standard = **STD****31 The calculation of the probability of detection and the generalized M Q-function***Shnidman, D.A.*

Information Theory, IEEE Transactions on , Volume: 35 Issue: 2 , March 1989

Page(s): 389 -400

[\[Abstract\]](#) [\[PDF Full-Text \(600 KB\)\]](#) [JNL](#)**32 Beam deviations of large linear arrays due to wavy phase errors***Nakatsuka, K.*

Antennas and Propagation, IEEE Transactions on , Volume: 36 Issue: 7 , July

Page(s): 1014 -1018

[\[Abstract\]](#) [\[PDF Full-Text \(368 KB\)\]](#) [JNL](#)[\[Prev\]](#) [1](#) [2](#) [3](#)

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#)
[Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2002 IEEE — All rights reserved

IEEE HOME | SEARCH IEEE | SHOP | WEB ACCOUNT | CONTACT IEEE

Membership Publications/Services Standards Conferences Careers/Jobs

IEEE Xplore™
RELEASE 1.3[Help](#) [FAQ](#) [Terms](#) [IEEE Peer](#) [Quick Links](#)[Review](#)

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 Print FormatYour search matched **61** of **749320** documents.Results are shown **25** to a page, sorted by **publication year** in **descending** order.

You may refine your search by editing the current search expression or entering a new one the te

Then click **Search Again**.**Results:**Journal or Magazine = **JNL** Conference = **CNF** Standard = **STD**

1 Design sensitivities using high-order tetrahedral vector elements*Webb, J.P.*

Magnetics, IEEE Transactions on , Volume: 37 Issue: 5 Part: 1 , Sept. 2001

Page(s): 3600 -3603

[\[Abstract\]](#) [\[PDF Full-Text \(208 KB\)\]](#) **JNL**

2 3D tetrahedron ray tracing algorithm*Zhang, Z.; Yun, Z.; Iskander, M.F.*

Electronics Letters , Volume: 37 Issue: 6 , 15 March 2001

Page(s): 334 -335

[\[Abstract\]](#) [\[PDF Full-Text \(220 KB\)\]](#) **JNL**

3 Efficient formulation approach for the forward kinematics of the 3-6 Stewart-Gough Platform*Se-Kyong Song; Dong-Soo Kwon*Intelligent Robots and Systems, 2001. Proceedings. 2001 IEEE/RSJ Internatio
Conference on , Volume: 3 , 2001

Page(s): 1688 -1693 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(487 KB\)\]](#) **CNF**

4 The electronic application of materials from the B-N-C-Si composio tetrahedron*Badzian, A.*Wide Bandgap Layers, 2001. Abstract Book. 3rd International Conference on
Applications of , 2001

Page(s): 31

[\[Abstract\]](#) [\[PDF Full-Text \(61 KB\)\]](#) [CNF](#)

5 New methodology for the forward kinematics of 6-DOF parallel man using tetrahedron configurations

Se-Kyong Song; Dong-Soo Kwon

Robotics and Automation, 2001. Proceedings 2001 ICRA. IEEE International Conference on , Volume: 2 , 2001

Page(s): 1307 -1312 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(496 KB\)\]](#) [CNF](#)

6 Deformation and cutting in virtual surgery

Shi Jiao-Ying; Yan Li-Xia

Medical Imaging and Augmented Reality, 2001. Proceedings. International Workshop on , 2001

Page(s): 95 -102

[\[Abstract\]](#) [\[PDF Full-Text \(616 KB\)\]](#) [CNF](#)

7 3-D element generation for multi-connected complex dental and maxillary structure

Jianxin Gao; Zuquan Ding; Guangzhong Yang

Medical Imaging and Augmented Reality, 2001. Proceedings. International Workshop on , 2001

Page(s): 267 -271

[\[Abstract\]](#) [\[PDF Full-Text \(504 KB\)\]](#) [CNF](#)

8 Efficient simplification of polygonal surface models

Hussain, M.; Okada, Y.; Nijima, K.

Information Visualisation, 2001. Proceedings. Fifth International Conference on

Page(s): 464 -469

[\[Abstract\]](#) [\[PDF Full-Text \(496 KB\)\]](#) [CNF](#)

9 Constant-time neighbor finding in hierarchical tetrahedral meshes

Lee, M.; De Floriani, L.; Samet, H.

Shape Modeling and Applications, SMI 2001 International Conference on , 2001

Page(s): 286 -295

[\[Abstract\]](#) [\[PDF Full-Text \(784 KB\)\]](#) [CNF](#)

10 Band-structure calculations of SiO₂ by means of Hartree-Fock density-functional techniques

Gnani, E.; Reggiani, S.; Colle, R.; Rudan, M.

Electron Devices, IEEE Transactions on , Volume: 47 Issue: 10 , Oct. 2000

Page(s): 1795 -1803

[\[Abstract\]](#) [\[PDF Full-Text \(636 KB\)\]](#) [JNL](#)

11 Constructing material interfaces from data sets with volume-fraction information

Bonnell, K.S.; Schikore, D.R.; Joy, K.I.; Duchaineau, M.; Hamann, B.

Visualization 2000. Proceedings , 2000

Page(s): 367 -372, 577

[\[Abstract\]](#) [\[PDF Full-Text \(532 KB\)\]](#) [CNF](#)

12 Tetrahedron based, least squares, progressive volume models with application to freehand ultrasound data

Roxborough, T.; Nielson, G.M.

Visualization 2000. Proceedings , 2000

Page(s): 93 -100

[\[Abstract\]](#) [\[PDF Full-Text \(536 KB\)\]](#) [CNF](#)

13 Fast multiresolution modeling of 3D objects using mesh-based wavelet analysis

Hongbin Zha; Mitsutomi, T.; Hasegawa, T.

Systems, Man, and Cybernetics, 2000 IEEE International Conference on , Volume: 2000

Page(s): 1394 -1399 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(480 KB\)\]](#) [CNF](#)

14 Dynamic rolling of modular robots

Woo Ho Lee; Sanderson, A.C.

Robotics and Automation, 2000. Proceedings. ICRA '00. IEEE International Conference on , Volume: 3 , 2000

Page(s): 2840 -2846 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(672 KB\)\]](#) [CNF](#)

15 A multilevel fast multipole algorithm for solving 3D volume integral equations of electromagnetic scattering

Lu, C.C.; Song, J.M.; Chew, W.C.

Antennas and Propagation Society International Symposium, 2000. IEEE , Vol 2000

Page(s): 1864 -1867 vol.4

[\[Abstract\]](#) [\[PDF Full-Text \(148 KB\)\]](#) [CNF](#)

16 Analysis of microwave rewarming of cryopreserved tissues

Lu, C.C.; Gao, D.Y.; Li, H.Z.

Antennas and Propagation Society International Symposium, 2000. IEEE , Vol 2000

Page(s): 1068 -1071 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(200 KB\)\]](#) [CNF](#)

17 Haar-like wavelets defined over tetrahedral grids

Boscardin, L.; Castro, L.; Castro, S.

Computer Science Society, 2000. SCCC '00. Proceedings. XX International Co of the Chilean , 2000

Page(s): 117 -125

[\[Abstract\]](#) [\[PDF Full-Text \(472 KB\)\]](#) [CNF](#)

18 Formation flying in elliptical orbits

Schiff, C.; Rohrbaugh, D.; Bristow, J.

Aerospace Conference Proceedings, 2000 IEEE , Volume: 7 , 2000

Page(s): 37 -47 vol.7

[\[Abstract\]](#) [\[PDF Full-Text \(1520 KB\)\]](#) [CNF](#)

19 Rapid solution of hybrid surface-volume integral equations for EM scattering by multilevel fast multipole algorithm

Lu, C.C.

Antennas, Propagation and EM Theory, 2000. Proceedings. ISAPE 2000. 5th International Symposium on , 2000

Page(s): 231 -234

[\[Abstract\]](#) [\[PDF Full-Text \(228 KB\)\]](#) [CNF](#)

20 Gram-Schmidt orthogonalization of equine ECG signals

Holcik, J.; Hanak, J.; Vaclavik, V.; Jahn, P.; Sedlinska, M.

Engineering in Medicine and Biology Society, 2000. Proceedings of the 22nd A International Conference of the IEEE , Volume: 2 , 2000

Page(s): 908 -911 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(240 KB\)\]](#) [CNF](#)

21 On a construction of a hierarchy of best linear spline approximation repeated bisection

Hamann, B.; Jordan, B.W.; Wiley, D.F.

Visualization and Computer Graphics, IEEE Transactions on , Volume: 5 Issue Jan.-March 1999

Page(s): 30 -46

[\[Abstract\]](#) [\[PDF Full-Text \(1236 KB\)\]](#) [JNL](#)

22 Voxelization chip design using FPGAs

Painkras, E.; Chan Chee Lei; Chok Ng Yong Ocean

TENCON 99. Proceedings of the IEEE Region 10 Conference , Volume: 1 , 1999

Page(s): 290 -293 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(348 KB\)\]](#) [CNF](#)

23 Accurate, finite-volume methods for three dimensional magneto-hydrodynamics on Lagrangian meshes

Rousculp, C.L.; Barnes, D.C.

Plasma Science, 1999. ICOPS '99. IEEE Conference Record - Abstracts. 1999 International Conference on , 1999

Page(s): 215

[\[Abstract\]](#) [\[PDF Full-Text \(88 KB\)\]](#) [CNF](#)

24 Tetrahedral mesh compression with the cut-border machine

Gumhold, S.; Guthe, S.; Strasser, W.

Visualization '99. Proceedings , 1999

Page(s): 51 -509

[\[Abstract\]](#) [\[PDF Full-Text \(968 KB\)\]](#) [CNF](#)

25 Closed-form forward position kinematics for a (3-1-1-1)/sup 2/ full parallel manipulator

Bruyninckx, H.

Robotics and Automation, IEEE Transactions on , Volume: 14 Issue: 2 , April 1

Page(s): 326 -328

[\[Abstract\]](#) [\[PDF Full-Text \(96 KB\)\]](#) [JNL](#)

1 2 3 [\[Next\]](#)

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#)
[Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2002 IEEE — All rights reserved

[IEEE HOME](#) | [SEARCH IEEE](#) | [SHOP](#) | [WEB ACCOUNT](#) | [CONTACT IEEE](#)[Membership](#) [Publications/Services](#) [Standards](#) [Conferences](#) [Careers/Jobs](#)**IEEE Xplore™**
RELEASE 1.3[Help](#) [FAQ](#) [Terms](#) [IEEE Peer](#) [Quick Links](#) [Review](#)» [Search](#)

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 [Print Format](#)Your search matched **2** of **749320** documents.Results are shown **25** to a page, sorted by **publication year** in **descending** order.You may refine your search by editing the current search expression or entering a new one the te
Then click **Search Again**.**Results:**Journal or Magazine = **JNL** Conference = **CNF** Standard = **STD****1 On a construction of a hierarchy of best linear spline approximations repeated bisection***Hamann, B.; Jordan, B.W.; Wiley, D.F.*

Visualization and Computer Graphics, IEEE Transactions on , Volume: 5 Issue Jan.-March 1999

Page(s): 30 -46

[\[Abstract\]](#) [\[PDF Full-Text \(1236 KB\)\]](#) **JNL****2 Simplification of tetrahedral meshes***Trotts, I.J.; Hamann, B.; Joy, K.I.; Wiley, D.F.*

Visualization '98. Proceedings , 1998

Page(s): 287 -295

[\[Abstract\]](#) [\[PDF Full-Text \(1208 KB\)\]](#) **CNF**

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#)
[Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2002 IEEE — All rights reserved

[IEEE HOME](#) | [SEARCH IEEE](#) | [SHOP](#) | [WEB ACCOUNT](#) | [CONTACT IEEE](#)[Membership](#) [Publications/Services](#) [Standards](#) [Conferences](#) [Careers/Jobs](#)**IEEE Xplore™**
RELEASE 1.3[Help](#) [FAQ](#) [Terms](#) [IEEE Peer](#) [Quick Links](#)[Review](#)

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 Print FormatYour search matched **1** of **749320** documents.Results are shown **25** to a page, sorted by **publication year** in **descending** order.

You may refine your search by editing the current search expression or entering a new one the te

Then click **Search Again**.**Results:**Journal or Magazine = **JNL** Conference = **CNF** Standard = **STD****1 Dynamic simulation model for two-phase mutually coupled reluctance machines***Reeve, J.M.; Pollock, C.*

Industry Applications Conference, 2001. Thirty-Sixth IAS Annual Meeting. Conference Record of the 2001 IEEE, Volume: 1, 2001

Page(s): 40 -47 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(1400 KB\)\]](#) **CNF**

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#)
[Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2002 IEEE — All rights reserved

[IEEE HOME](#) | [SEARCH IEEE](#) | [SHOP](#) | [WEB ACCOUNT](#) | [CONTACT IEEE](#)[Membership](#) | [Publications/Services](#) | [Standards](#) | [Conferences](#) | [Careers/Jobs](#)**IEEE Xplore**
RELEASE 1.3[Help](#) | [FAQ](#) | [Terms](#) | [IEEE Peer](#) | [Quick Links](#)[Review](#)

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 Print Format**SEARCH RESULTS** [PDF Full-Text (1400 KB)]

Dynamic simulation model for two-phase mutually coupled reluctance machine
- Reeve, J.M.; Pollock, C.

Dept. of Eng., Leicester Univ., UK

This paper appears in: Industry Applications Conference, 2001. Thirty-Sixth IAS Meeting. Conference Record of the 2001 IEEE

On page(s): 40 - 47 vol.1

30 Sept.-4 Oct. 2001

Chicago, IL, USA

2001

Volume: 1

ISBN: 0-7803-7114-3

IEEE Catalog Number: 01CH37248

Number of Pages: 4 vol.xxxvii+2743

References Cited: 23

INSPEC Accession Number: 7081518

Abstract:

This paper presents a simple yet robust and flexible dynamic simulation model two-phase reluctance type machines. Normalized electromagnetic properties of lamination geometry, the 'flux map', are obtained using nonlinear magnetostat element analysis (FEA). A data conversion algorithm is developed to convert the form suitable for voltage driven dynamic simulation, i.e. a two-phase coupled flux-MMF-position characterization. System dynamic equations are derived and with the Gauss-Seidel method using the converted data without further need for comparison with experimental results for an 8/4 flux switching machine with a shows good agreement. This model can be used to rapidly simulate any winding configuration or excitation scheme based upon the characterized geometry and especially suitable for commercial design.

Index Terms:

reluctance machines; machine theory; electromagnetic fields; laminations; magnetic iterative methods; finite element analysis; two-phase mutually coupled reluctance machines; dynamic simulation model; electromagnetic properties; lamination g flux map; nonlinear magnetostatic finite element analysis; data conversion algorithm; voltage driven dynamic simulation; two-phase coupled flux-MMF-position characterization; dynamic equations; Gauss-Seidel method; winding configuration; excitation scheme

SEARCH RESULTS [PDF Full-Text (1400 KB)]

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#) | [Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [E](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#)

Copyright © 2002 IEEE — All rights reserved

IEEE HOME | SEARCH IEEE | SHOP | WEB ACCOUNT | CONTACT IEEE

Membership Publications/Services Standards Conferences Careers/Jobs

IEEE Xplore™

RELEASE 1.3

Help FAQ Terms IEEE Peer Quick Links

Review

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 Print Format

Your search matched **36** of **749320** documents.

Results are shown **25** to a page, sorted by **publication year** in **descending** order.

You may refine your search by editing the current search expression or entering a new one the te

Then click **Search Again**.

Results:

Journal or Magazine = **JNL** Conference = **CNF** Standard = **STD**

1 Adaptive filtering algorithms with selective partial updates

Dogancay, K.; Tanrikulu, O.

Circuits and Systems II: Analog and Digital Signal Processing, IEEE Transacti
Volume: 48 Issue: 8 , Aug. 2001

Page(s): 762 -769

[\[Abstract\]](#) [\[PDF Full-Text \(224 KB\)\]](#) **JNL**

2 Match between normalization schemes and feature sets for handwri Chinese character recognition

Qing Wang; Zheru Chi; Feng, D.D.; Rongchun Zhao

Document Analysis and Recognition, 2001. Proceedings. Sixth International C
on , 2001

Page(s): 551 -555

[\[Abstract\]](#) [\[PDF Full-Text \(416 KB\)\]](#) **CNF**

3 Classes for fast maximum entropy training

Goodman, J.

Acoustics, Speech, and Signal Processing, 2001. Proceedings. 2001 IEEE
InternationalConference on , Volume: 1 , 2001

Page(s): 561 -564 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(400 KB\)\]](#) **CNF**

4 A comprehensive examination of neural network architectures for an fault diagnosis

Aminian, M.; Aminian, F.

Neural Networks, 2001. Proceedings. IJCNN '01. International Joint Conferenc
Volume: 3 , 2001
Page(s): 2304 -2309 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(436 KB\)\]](#) **CNF**

5 Parametric estimate of intensity inhomogeneities applied to MRI
Styner, M.; Brechbuhler, C.; Szckely, G.; Gerig, G.
Medical Imaging, IEEE Transactions on , Volume: 19 Issue: 3 , March 2000
Page(s): 153 -165

[\[Abstract\]](#) [\[PDF Full-Text \(1380 KB\)\]](#) **JNL**

6 Constructing chaotic discrete sequences for digital communications correlation analysis
Tao Sang; Ruli Wang; Yixun Yan
Signal Processing, IEEE Transactions on , Volume: 48 Issue: 9 , Sept. 2000
Page(s): 2557 -2565

[\[Abstract\]](#) [\[PDF Full-Text \(420 KB\)\]](#) **JNL**

7 Adaptive pole-placement control of MIMO stochastic systems
Wen-Shyong Yu; Hung-Ming Huang
Decision and Control, 2000. Proceedings of the 39th IEEE Conference on , Vol 2000
Page(s): 1121 -1126 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(504 KB\)\]](#) **CNF**

8 Rescaling the energy function in Hopfield networks
Xinchuan Zeng; Martinez, T.R.
Neural Networks, 2000. IJCNN 2000, Proceedings of the IEEE-INNS-ENNS Int Joint Conference on , Volume: 6 , 2000
Page(s): 498 -502 vol.6

[\[Abstract\]](#) [\[PDF Full-Text \(344 KB\)\]](#) **CNF**

9 An information system for systematic validation of the software use vehicular microcontrollers
Bhogaraju, S.; Singh, G.B.; Edwards, G.; Limberg, J.; Watson, M.; Gobrogge,
Intelligent Vehicles Symposium, 2000. IV 2000. Proceedings of the IEEE , 200
Page(s): 104 -109

[\[Abstract\]](#) [\[PDF Full-Text \(452 KB\)\]](#) **CNF**

10 Convergence analysis of an oversampled subband adaptive filtering structure using global error

Alves, R.G.; Petraglia, M.R.; Diniz, P.S.R.

Acoustics, Speech, and Signal Processing, 2000. ICASSP '00. Proceedings. 20 International Conference on , Volume: 1 , 2000

Page(s): 468 -471 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(284 KB\)\]](#) **CNF**

11 Selective-partial-update NLMS and affine projection algorithms for echo cancellation

Dogancay, K.; Tanrikulu, O.

Acoustics, Speech, and Signal Processing, 2000. ICASSP '00. Proceedings. 20 International Conference on , Volume: 1 , 2000

Page(s): 448 -451 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(288 KB\)\]](#) **CNF**

12 Sealing of micromachined cavities using chemical vapor deposition methods: characterization and optimization

Chang Liu; Yu-Chong Tai

Microelectromechanical Systems, Journal of , Volume: 8 Issue: 2 , June 1999

Page(s): 135 -145

[\[Abstract\]](#) [\[PDF Full-Text \(528 KB\)\]](#) **JNL**

13 Linear theory of the multi-stage Gyro-TWT

Nusinovich, G.; Walter, M.

Plasma Science, 1999. ICOPS '99. IEEE Conference Record - Abstracts. 1999 International Conference on , 1999

Page(s): 226

[\[Abstract\]](#) [\[PDF Full-Text \(92 KB\)\]](#) **CNF**

**14 Numerical modeling of weakly fused fiber-optic polarization beams
I. Accurate calculation of coupling coefficients and form birefringence**

Szu-Wen Yang; Hung-Chun Chang

Lightwave Technology, Journal of , Volume: 16 Issue: 4 , April 1998

Page(s): 685 -690

[\[Abstract\]](#) [\[PDF Full-Text \(228 KB\)\]](#) **JNL**

15 Fast design of reduced-complexity nearest-neighbor classifiers using triangular inequality

Eel-Wan Lee; Soo-Ik Chae

Pattern Analysis and Machine Intelligence, IEEE Transactions on , Volume: 20
May 1998

Page(s): 562 -566

[\[Abstract\]](#) [\[PDF Full-Text \(176 KB\)\]](#) **JNL**

16 Digital modulation classification using power moment matrices

Hero, A.O., III; Hadinejad-Mahram, H.

Acoustics, Speech and Signal Processing, 1998. Proceedings of the 1998 IEEE International Conference on , Volume: 6 , 1998

Page(s): 3285 -3288 vol.6

[\[Abstract\]](#) [\[PDF Full-Text \(508 KB\)\]](#) **CNF**

17 Exploitation of hyperspectral imagery and lidar for landuse classification

Perry, E.M.; Foote, H.P.; Petrie, G.M.; Steinmaus, K.L.; Irwin, D.E.; Stephan,
Geoscience and Remote Sensing Symposium Proceedings, 1998. IGARSS '98.
IEEE International , Volume: 2 , 1998

Page(s): 1013 -1015 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(248 KB\)\]](#) **CNF**

18 Enhancements in the determination of ocean surface wave height from grazing incidence microwave backscatter

Buckley, J.R.; Aler, J.

Geoscience and Remote Sensing Symposium Proceedings, 1998. IGARSS '98.
IEEE International , Volume: 5 , 1998

Page(s): 2487 -2489 vol.5

[\[Abstract\]](#) [\[PDF Full-Text \(260 KB\)\]](#) **CNF**

19 Neural network based minutiae filtering in fingerprints

Maio, D.; Maltoni, D.

Pattern Recognition, 1998. Proceedings. Fourteenth International Conference
Volume: 2 , 1998

Page(s): 1654 -1658 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(156 KB\)\]](#) **CNF**

20 Accurate frequency-domain modeling and efficient circuit simulation of high-speed packaging interconnects

Beyene, W.T.; Schutt-Aine, J.

Microwave Theory and Techniques, IEEE Transactions on , Volume: 45 Issue: , Oct. 1997

Page(s): 1941 -1947

[\[Abstract\]](#) [\[PDF Full-Text \(184 KB\)\]](#) [JNL](#)

21 A Fourier descriptor model of hysteresis loops for sinusoidal and di waveforms

Mohammed, I.A.; Al-Hashemy, B.A.R.; Tawfik, M.A.

Magnetics, IEEE Transactions on , Volume: 33 Issue: 1 Part: 2 , Jan. 1997

Page(s): 686 -691

[\[Abstract\]](#) [\[PDF Full-Text \(428 KB\)\]](#) [JNL](#)

22 Probability of error in MMSE multiuser detection

Poor, H.V.; Verdu, S.

Information Theory, IEEE Transactions on , Volume: 43 Issue: 3 , May 1997

Page(s): 858 -871

[\[Abstract\]](#) [\[PDF Full-Text \(596 KB\)\]](#) [JNL](#)

23 A modular analog NLMS structure for system identification

Nino-de-Rivera, L.; Perez-Meana, H.; Sanchez-Sinencio, E.

Circuits and Systems, 1997. Proceedings of the 40th Midwest Symposium on 2 , 1998

Page(s): 835 -840 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(448 KB\)\]](#) [CNF](#)

24 Reduced-complexity sequence detection approaches for PR-shaped linear modulations

Rizos, A.D.; Proakis, J.G.

Global Telecommunications Conference, 1997. GLOBECOM '97., IEEE , Volume

Page(s): 342 -346 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(608 KB\)\]](#) [CNF](#)

25 Convergence of the delayed normalized LMS algorithm with decrea size

Sang-Sik Ahn; Voltz, P.J.

Signal Processing, IEEE Transactions on , Volume: 44 Issue: 12 , Dec. 1996

Page(s): 3008 -3016

[\[Abstract\]](#) [\[PDF Full-Text \(852 KB\)\]](#) **JNL**

1 2 [\[Next\]](#)

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#)
[Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2002 IEEE — All rights reserved

IEEE HOME | SEARCH IEEE | SHOP | WEB ACCOUNT | CONTACT IEEE

Membership Publications/Services Standards Conferences Careers/Jobs

IEEE Xplore
RELEASE 1.3[Help](#) [FAQ](#) [Terms](#) [IEEE Peer](#) [Quick Links](#)[Review](#)

Welcome to IEEE Xplore

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 Print FormatYour search matched **36** of **749320** documents.Results are shown **25** to a page, sorted by **publication year** in **descending** order.

You may refine your search by editing the current search expression or entering a new one the te

Then click **Search Again**.**Results:**Journal or Magazine = **JNL** Conference = **CNF** Standard = **STD**

26 SEEMORE: a view-based approach to 3-D object recognition using m visual cues*Mel, B.W.*

Pattern Recognition, 1996., Proceedings of the 13th International Conference

Volume: 1, 1996

Page(s): 570 -574 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(476 KB\)\]](#) **CNF**

27 Proper prior marginalization of the conditional ML model for combi model selection/source localization*Radich, B.M.; Buckley, K.M.*

Acoustics, Speech, and Signal Processing, 1995. ICASSP-95., 1995 Internatio Conference on , Volume: 3, 1995

Page(s): 2084 -2087 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(264 KB\)\]](#) **CNF**

28 Accurate 3D detector response compensation in SPECT using multig iterative reconstruction methods*Tsui, B.M.W.; Zhao, X.-D.; Frey, E.C.*

Nuclear Science Symposium and Medical Imaging Conference Record, 1995., , Volume: 2, 1995

Page(s): 1151 -1155 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(636 KB\)\]](#) **CNF**

29 Almost-sure convergence of the non-homogeneous DNLMS algorithm

decreasing step size*Sang-Sik Ahn; Voltz, P.J.*

Acoustics, Speech, and Signal Processing, 1994. ICASSP-94., 1994 IEEE Inter Conference on , Volume: iii , 1994

Page(s): III/401 -III/404 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(208 KB\)\]](#) **CNF****30 Reduced shift invariant second order neural networks using principal component analysis and pixel combinations***Bong-Kyu Lee; Dong-Kyu Kim; Yoo-Kun Cho; Heong-Ho Lee; Hee-Yeung Hwa*

Neural Networks, 1994. IEEE World Congress on Computational Intelligence.,

IEEE International Conference on , Volume: 7 , 1994

Page(s): 4283 -4287 vol.7

[\[Abstract\]](#) [\[PDF Full-Text \(348 KB\)\]](#) **CNF****31 CORDIC based pipeline architecture for all-pass filters***Nikolaidis, S.S.; Metafas, D.E.; Goutis, C.E.*

Circuits and Systems, 1993., ISCAS '93, 1993 IEEE International Symposium 1993

Page(s): 1917 -1920 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(344 KB\)\]](#) **CNF****32 Optimising hidden Markov models using discriminative output distributions***Woodland, P.C.; Cole, D.R.*

Acoustics, Speech, and Signal Processing, 1991. ICASSP-91., 1991 International Conference on , 1991

Page(s): 545 -548 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(400 KB\)\]](#) **CNF****33 A stochastic Newton algorithm with data-adaptive step size***Davila, C.E.*

Acoustics, Speech and Signal Processing [see also IEEE Transactions on Signal Processing], IEEE Transactions on , Volume: 38 Issue: 10 , Oct. 1990

Page(s): 1796 -1798

[\[Abstract\]](#) [\[PDF Full-Text \(232 KB\)\]](#) **JNL****34 Modeling of an RF electron accelerator***Gitomer, S.J.; Jones, M.E.*

Plasma Science, 1990. IEEE Conference Record - Abstracts., 1990 IEEE Intern

Conference on , 1990

Page(s): 214

[\[Abstract\]](#) [\[PDF Full-Text \(92 KB\)\]](#) **CNF**

35 The design of linear shift-variant digital filters using interpolation t

Hui, Zhang; Wang, Dejung; Zhao, Zhengang

TENCON '89. Fourth IEEE Region 10 International Conference , 1989

Page(s): 263 -265

[\[Abstract\]](#) [\[PDF Full-Text \(208 KB\)\]](#) **CNF**

36 Bus load modelling and forecasting

Handschin, E.; Dornemann, C.

Power Systems, IEEE Transactions on , Volume: 3 Issue: 2 , May 1988

Page(s): 627 -633

[\[Abstract\]](#) [\[PDF Full-Text \(400 KB\)\]](#) **JNL**

[\[Prev\]](#) [1](#) [2](#)

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#)
[Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2002 IEEE — All rights reserved

[IEEE HOME](#) | [SEARCH IEEE](#) | [SHOP](#) | [WEB ACCOUNT](#) | [CONTACT IEEE](#)[Membership](#) [Publications/Services](#) [Standards](#) [Conferences](#) [Careers/Jobs](#)**IEEE Xplore™**
RELEASE 1.3[Help](#) [FAQ](#) [Terms](#) [IEEE Peer](#) [Quick Links](#)[Review](#)

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 [Print Format](#)Your search matched **1** of **749320** documents.Results are shown **25** to a page, sorted by **publication year** in **descending** order.

You may refine your search by editing the current search expression or entering a new one the te

Then click **Search Again**.**Results:**Journal or Magazine = **JNL** Conference = **CNF** Standard = **STD****1 Recursive least-squares lattices and trigonometry in the spherical tr**
*Desbouvries, F.*Acoustics, Speech, and Signal Processing, 1993. ICASSP-93., 1993 IEEE Inter
Conference on , Volume: 3 , 1993

Page(s): 404 -407 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(304 KB\)\]](#) **CNF**

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#)
[Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2002 IEEE — All rights reserved

IEEE HOME | SEARCH IEEE | SHOP | WEB ACCOUNT | CONTACT IEEE

Membership Publications/Services Standards Conferences Careers/Jobs

IEEE Xplore™
RELEASE 1.3[Help](#) [FAQ](#) [Terms](#) [IEEE Peer](#) [Quick Links](#)[Review](#)

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 [Print Format](#)**SEARCH RESULTS [PDF Full-Text (304 KB)]**Recursive least-squares lattices and trigonometry in the spherical triangle
- Desbouvries, F.

Inst. Nat. des Telecommun., Evry, France

This paper appears in: Acoustics, Speech, and Signal Processing, 1993. ICASSP
IEEE International Conference on

On page(s): 404 - 407 vol.3

27-30 April 1993

Minneapolis, MN, USA

1993

Volume: 3

ISBN: 0-7803-0946-4

Number of Pages: 5 vol. (652+735+606+559+681)

References Cited: 13

INSPEC Accession Number: 4777675

Abstract:

The three fundamental planar biorthogonalization steps which underlie the geo derivation of the fast recursive least squares (FRLS) adaptive lattices are gathered in a unit-length 3-D tetrahedron. The inverse of Yule's PARCOR Identity (YPII) then provides a nice geometric interpretation in terms of projections into this tetrahedron. Since tetrahedrons are closely related to spherical triangles, YPII is recognized as the fundamental 'cosine law' of spherical trigonometry. In that framework, the angle-normalized RLS lattice recursions happen to be one particular solution to six spherical triangle problems. The practical interest of this geometric interpretation is that one can take advantage of spherical trigonometry to derive unnoticed recursive least squares among RLS quantities. This leads, for instance, to an original 'dual' version of Yule's PARCOR Identity.

Index Terms:

trigonometry; planar biorthogonalization steps; recursive least squares; adaptive geometric interpretation; spherical trigonometry; adaptive filters; computation geometry; filtering and prediction theory; least squares approximations

SEARCH RESULTS [PDF Full-Text (304 KB)]

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#) | [Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [E-mail](#) | [No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#)

Copyright © 2002 IEEE — All rights reserved

RECURSIVE LEAST-SQUARES LATTICES AND TRIGONOMETRY IN THE SPHERICAL TRIANGLE

F. Desbouvries

Institut National des Télécommunications, 9 rue Charles Fourier, 91011 Evry, France

ABSTRACT

The 3 fundamental planar biorthogonalization steps which underlie the geometric derivation of the FRLS adaptive lattices are gathered into a unit-length 3D tetrahedron. The inverse of Yule's PARCOR Identity (YPII) then admits a nice geometric interpretation in terms of projections into this tetrahedron. Since tetrahedrons are closely related to spherical triangles, YPII is recognized as the fundamental "cosine law" of spherical trigonometry. In that framework, the angle-normalized RLS lattice recursions happen to be one particular solution to one of the six spherical triangle problems. The practical interest of this brand new geometric interpretation is that we can take advantage of the well-trodden path of spherical trigonometry to derive unnoticed recursions among RLS quantities. This leads, for instance, to an original "dual" version of YPII.

1 - INTRODUCTION

Fast Recursive Least-Squares (FRLS) prewindowed (PW) algorithms are well known to exist under three different structures : transversal, lattice, and QRD-based filters. The Recursive Least-Squares Lattice (RLSL) has been known for a long time now [1]. Later on, Lee et al showed that the RLSL basic cell reduces to a recursion among 3 variables only, when appropriate normalization is performed. The incoming entries are the forward and delayed backward "double-" or "angle-" normalized prediction errors, \tilde{e}_{n-1}^f and \tilde{e}_{n-1}^b , at order $n-1$, together with the n^{th} order PARCOR ρ_n^{f-1} at time $t-1$. The algorithm first updates the PARCOR, then computes the forward and backward errors at order n (1-a,b,c) :

$$\begin{aligned}\rho_n^f &= \tilde{e}_{n-1}^f (\tilde{e}_{n-1}^b)^T + (I - \tilde{e}_{n-1}^f (\tilde{e}_{n-1}^f)^T)^{\frac{1}{2}} \rho_{n-1}^{f-1} (I - \tilde{e}_{n-1}^b (\tilde{e}_{n-1}^b)^T)^{\frac{1}{2}} \\ \tilde{e}_n^f &= (I - \rho_n^f (\rho_n^f)^T)^{-\frac{1}{2}} (\tilde{e}_{n-1}^f - \rho_n^f \tilde{e}_{n-1}^b) (I - (\tilde{e}_{n-1}^b)^T \tilde{e}_{n-1}^b)^{-\frac{1}{2}} \\ \tilde{e}_n^b &= (I - (\rho_n^f)^T \rho_n^f)^{-\frac{1}{2}} (\tilde{e}_{n-1}^b - (\rho_n^f)^T \tilde{e}_{n-1}^f) (I - (\tilde{e}_{n-1}^f)^T \tilde{e}_{n-1}^f)^{-\frac{1}{2}}\end{aligned}$$

These recursions were derived both algebraically [2] and geometrically [2], [3]. However this first geometric derivation was rather lengthy and presented the disadvantage to make a clear distinction between, on the one hand, the order recursive equations (1-b), (1-c); and on the other hand, the pure time-update (1-a), the derivation of which needed to introduce a complicated decomposition of some orthogonal projection in terms of oblique projections.

Both derivations were reconciled in a most elegant way [4] when it appeared that (1-b), (1-c) as well as a reordering (1-d) of (1-a) :

$\rho_n^{f-1} = (I - \tilde{e}_{n-1}^f (\tilde{e}_{n-1}^f)^T)^{-\frac{1}{2}} (\rho_n^f - \tilde{e}_{n-1}^f (\tilde{e}_{n-1}^b)^T) (I - \tilde{e}_{n-1}^b (\tilde{e}_{n-1}^b)^T)^{-\frac{1}{2}}$ were 3 particular applications of a general identity among partial correlation coefficients, first discovered (in the scalar case) by Yule [5].

In this paper, we first gather the 3 fundamental planar biorthogonalization steps which underlie the RLS adaptive lattice in a 3D unit-length tetrahedron. YPII then receives a nice new geometric interpretation in terms of projections into this tetrahedron.

Now, tetrahedrons and spherical triangles are closely related figures in the 3D space. Deriving projective identities into tetrahedrons thus amounts to deriving trigonometric relations on the sphere. It then happens that YPII is indeed the fundamental cosine law of spherical trigonometry. In that new geometrical framework, the old, classical angle-normalized RLS lattice algorithm happens to be one particular solution to one of the six spherical triangle problems.

Furthermore, the formulae of spherical trigonometry induce, by analogy, similar recursions among parcor. For instance, the cosine law in the polar triangle leads to an original "dual" version of YPII.

2 - UPDATING OF PROJECTION OPERATORS AND PLANAR BIORTHOGONALIZATION STEPS

The following derivation can be formalized in any Hilbert space (since we are just concerned with projection identities), and more specifically in the space $L^2(\Omega, \mathcal{A}, P)$ of square-integrable random variables with inner product $\langle X, Y \rangle = E(XY^T)$. In this paper, we will adopt the perhaps more familiar alternative viewpoint of deterministic adaptive filtering. The framework is thus the space R^N of N -dimensional vectors. More generally, for reasons to become clear soon, X (and also Y, A, B, C) will denote in the sequel any arbitrary aggregate of n_X ($1 \leq n_X \leq N$) N -dimensional vectors (see e.g. [3] for details); the inner product among X and Y is defined as $\langle X, Y \rangle = X^T Y$; X is orthogonal to Y ($X \perp Y$) if $\langle X, Y \rangle = 0_{n_X \times n_Y}$.

The linear combination \hat{x} of a set of vectors $Y = [y_1 \dots y_{n_Y}]$ that best fits (in a LS sense : $\|x - \hat{x}\|$ min) a vector x is well known to be the projection of x onto the space spanned by the vectors of Y . Thus LS filtering is intimately connected with projecting onto a vector space. Recursive LS filtering is concerned with updating the optimal solution on arrival of new data; it thus amounts to updating projection operators. Let $P_X = X(X^T X)^{-1} X^T$ denote the projection operator onto the space spanned by X , and

$P_X^\perp = I - X(X^T X)^{-1} X^T$ its orthogonal complement¹. Now, a key tool for updating projection operators is the fact that the projection onto the augmented subspace (X, Y) is equal to the projection onto X , plus the projection onto that part of Y which is orthogonal to X :

$$P_{X,Y} = P_X + P_X^\perp Y(Y^T P_X^\perp Y)^{-1} Y^T P_X^\perp \quad (2-a)$$

$$P_{X,Y}^\perp = P_X^\perp - P_X^\perp Y(Y^T P_X^\perp Y)^{-1} Y^T P_X^\perp \quad (2-b)$$

These identities are of utmost importance in RLS adaptive filtering as well as in Kalman filtering.

Let us now recall some known results [6], [7]. From (2-b), we see that we can go from $P_Y^\perp A$ to $P_{Y,B}^\perp A$ with the help of $P_Y^\perp B$:

$$P_{Y,B}^\perp A = P_Y^\perp A - P_Y^\perp B(B^T P_Y^\perp B)^{-1}(B^T P_Y^\perp A) \quad (3-a)$$

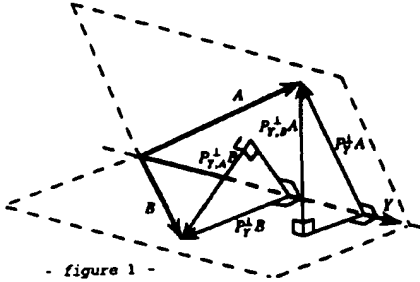
apart from the obvious orthogonality relationships:

$$P_Y^\perp A \perp Y, \quad P_Y^\perp B \perp Y, \quad P_{Y,B}^\perp A \perp Y, B$$

there appears a new one among the 3 above vectors:

$$P_{Y,B}^\perp A \perp P_Y^\perp B \quad (3-b)$$

Now, from the 2 elementary residuals $P_Y^\perp A$, $P_Y^\perp B$ used in (3-a), we can construct as well the 2nd augmented residual $P_{Y,A}^\perp B$. Similarly, $P_{Y,A}^\perp B \perp P_Y^\perp A$. This leads to fig.1:



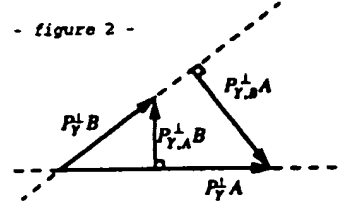
- figure 1 -

The coupled recursions $(P_Y^\perp A, P_Y^\perp B) \rightarrow (P_{Y,A}^\perp B, P_{Y,B}^\perp A)$ are thus a "planar" biorthogonalization process (4):

$$\begin{bmatrix} P_{Y,A}^\perp B & P_{Y,B}^\perp A \end{bmatrix} = \begin{bmatrix} P_Y^\perp A & P_Y^\perp B \end{bmatrix} \begin{bmatrix} I & -(A^T P_Y^\perp A)^{-1}(A^T P_Y^\perp B) \\ -(B^T P_Y^\perp B)^{-1}(B^T P_Y^\perp A) & I \end{bmatrix}$$

with $P_{Y,B}^\perp A \perp P_Y^\perp B$, $P_{Y,A}^\perp B \perp P_Y^\perp A$.

This is maybe best visualized by fig.2, drawn out of fig.1 (for the 2 right triangles lie in parallel planes):



- figure 2 -

It will soon be necessary to manipulate normalized residuals, defined as³:

$$\overline{P_Y^\perp A} \triangleq P_Y^\perp A (A^T P_Y^\perp A)^{-\frac{1}{2}} \quad (5-a)$$

in which $M^{1/2}$ denotes any square-root of the positive definite matrix M , i.e., $M^{\frac{1}{2}}(M^{\frac{1}{2}})^T = M^{\frac{1}{2}} M^{\frac{1}{2}} = M$. Then we have:

$$\begin{bmatrix} \overline{P_Y^\perp A} \\ \overline{P_Y^\perp B} \end{bmatrix}^T \begin{bmatrix} \overline{P_Y^\perp A} \\ \overline{P_Y^\perp B} \end{bmatrix} = I_{n_A \times n_A}, \quad P_{Y,A}^\perp = \overline{P_Y^\perp A} (\overline{P_Y^\perp A})^T = P_{Y,A}^\perp \quad (5-b,c)$$

(4) admits the normalized version (6-a,b):

$$\begin{bmatrix} \overline{P_{Y,A}^\perp B} & \overline{P_{Y,B}^\perp A} \end{bmatrix} = \begin{bmatrix} \overline{P_Y^\perp A} & \overline{P_Y^\perp B} \end{bmatrix} \begin{bmatrix} I & -\rho \\ -\rho^T & I \end{bmatrix} \begin{bmatrix} (I - \rho \rho^T)^{-\frac{1}{2}} & 0 \\ 0 & (I - \rho^T \rho)^{-\frac{1}{2}} \end{bmatrix}$$

in which $\rho = \rho_Y(A, B)$ is the PARCOR (7):

$$\rho_Y(A, B) \triangleq \left(\overline{P_Y^\perp A}^T \overline{P_Y^\perp B} \right)$$

$$= (A^T P_Y^\perp A)^{-\frac{1}{2}} (A^T P_Y^\perp B) (B^T P_Y^\perp B)^{-\frac{1}{2}} = \rho_Y^T(B, A)$$

and we used the identity (8):

$$(B^T P_Y^\perp B)^{-\frac{1}{2}} (B^T P_{Y,A}^\perp B)^{\frac{1}{2}} = (I - \rho_Y(B, A) \rho_Y(A, B))^{\frac{1}{2}}$$

which is soon derived from (2-b).

3 - YULE'S PARCOR IDENTITY IN THE UNIT-LENGTH 3D TETRAHEDRON

Yule's PARCOR Identity is a formula that expresses the augmented parcor $\rho_{Y,A}(C, B)$, say, in terms of the elementary ones $\rho_Y(A, C)$, $\rho_Y(B, A)$ and $\rho_Y(C, B)$. It is simply derived by pre- (post-) multiplying (2-b) by $(C^T P_Y^\perp C)^{-\frac{1}{2}} C^T$ (by $B(B^T P_Y^\perp B)^{-\frac{1}{2}}$), and by using (7), (8) (see [8], Annex A, for details):

$$\rho_{Y,A}(C, B) = (I - \rho_Y(C, A) \rho_Y(A, C))^{-\frac{1}{2}} \times \quad (9)$$

$$(\rho_Y(C, B) - \rho_Y(C, A) \rho_Y(A, B)) \times (I - \rho_Y(B, A) \rho_Y(A, B))^{-\frac{1}{2}}$$

(9) admits the reordered (sometimes called "inverse") version:

$$\rho_Y(C, B) = \rho_Y(C, A) \rho_Y(A, B) + (I - \rho_Y(C, A) \rho_Y(A, C))^{\frac{1}{2}} \times \quad (10)$$

$$\rho_{Y,A}(C, B) \times (I - \rho_Y(B, A) \rho_Y(A, B))^{\frac{1}{2}}$$

(9) and (10) are fundamental in RLS lattice filtering, since the angle-normalized lattice recursions (1) are nothing but particular applications of (9) (or (10)). More precisely, let $\{y_i\}$ be a m -dimensional process. Define the $(i+1) \times m$ matrix $y_{i-p} = [0 \dots 0 y_0 \dots y_{i-p}]^T$ (the p first rows are zeros), and the $(i+1) \times 1$ vector $\sigma = [0 \dots 0 1]^T$ (the "pinning vector"). Then (1) is

3 we assume that $A^T P_Y^\perp A$ is positive definite. The positive semi-definite case is treated in (8).

1 whenever the projection operator considered, we suppose that $X^T X$ is invertible (otherwise we can take generalized inverses [8])

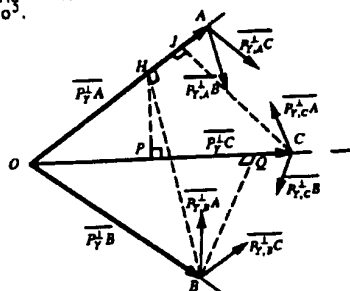
2 Since Y, A and B lie in 3 disjoint subspaces of R^N (the null vector is the only vector common to any two out of these three subspaces), they are visualized by non-coplanar vectors in fig.1 which, necessarily, is 3-dimensional. On the other hand, both $P_{Y,B}^\perp A$ and $P_{Y,A}^\perp B$ lie in the space spanned by the 2 "vectors" $P_Y^\perp A$ and $P_Y^\perp B$ (actually a N_{m_A} and a N_{m_B} matrix, respectively); whence the (improper) use of the term "planar".

obtained from (9) by setting $Y = [y_1, \dots, y_{i-1}]$, and by replacing (A, B, C) by the following permutations of (y_i, y_{i-1}, σ) [4], [9]:

	A	B	C
(1-b)	y_{i-1}	σ	y_i
(1-c)	y_i	σ	y_{i-1}
(1-d)	σ	y_{i-1}	y_i

Now, transformations among residual vectors induce transformations among the filters which produced these residuals. Consequently, the FRLS transversal filter recursions are derived by considering the 3 particular applications of (6), when we take for A and B any 2 aggregates out of the set (y_i, y_{i-1}, σ) [9], [7]. On the other hand, the FRLS angle-normalized lattice recursions are the 3 particular applications of (9) or (10), obtained by taking the inner product of (6-a), written for 2 particular aggregates taken out of the same set (y_i, y_{i-1}, σ) , by that same formula, written for another 2 aggregates [9] (3 possibilities: $(P_{Y,Y}^{-1}, y_{i-1}, P_{Y,Y}^{-1}, \sigma)$; $(P_{Y,Y}^{-1}, y_i, P_{Y,Y}^{-1}, \sigma)$; $(P_{Y,\sigma}^{-1}, P_{Y,\sigma}^{-1}, y_{i-1}, y_i)$). Note that a similar approach was used in [6].

This suggests that the geometric figure that best represents the FRLS problem, in both transversal and lattice structures, might be the 3D unit-length tetrahedron $(P_{Y,Y}^{-1}, P_{Y,Y}^{-1}, P_{Y,\sigma}^{-1})$ - or, more generally, $(P_{Y,A}^{-1}, P_{Y,B}^{-1}, P_{Y,C}^{-1})$ of fig.3⁴. In general, one cannot visualize more than three disjoint subspaces of R^N . However, in view of fig.2 (or recursions (6)), the 6 augmented residuals $P_{Y,A}^{-1}, P_{Y,B}^{-1}, P_{Y,C}^{-1}, P_{Y,A}^{-1}, P_{Y,B}^{-1}$ and $P_{Y,C}^{-1}$ take place in the same figure too⁵.



- figure 3 -

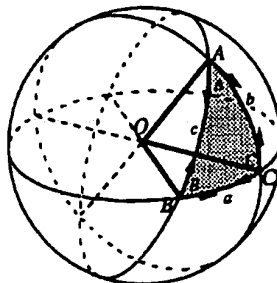
In the annex, we rederive (10) (i.e., YPII) in terms of projections inside this tetrahedron. More precisely, we show that the "length" of \overrightarrow{OQ} , where Q is the orthogonal projection of B onto A, is equal to $\rho_Y(C, B)$, the l.h.s. of (10). Now, B can be first projected onto OA, resulting in H, and H can again be projected onto OC, which gives P. This results in decomposing \overrightarrow{OQ} as $\overrightarrow{OP} + \overrightarrow{PQ}$. This decomposition corresponds exactly to the two-terms sum of the r.h.s. of (10), i.e., the length OP of \overrightarrow{OP} is equal to $\rho_Y(C, A)\rho_Y(A, B)$, while the 2nd term of the r.h.s. of (10) is equal to the length of \overrightarrow{PQ} .

4 as far as notations are concerned, the same letter A is used for an aggregate of vectors; for the extremity of $\overrightarrow{P_{Y,A}^{-1}}$ in the representation of fig.3; and, in the following, for a point on the sphere as well as for an angle, in fig.4. The true meaning should be clear from the context.

5 in order to maintain clarity, we just represented the direction of those 6 vectors (they are actually of length one).

4 - CONNECTIONS WITH SPHERICAL TRIGONOMETRY

Tetrahedrons (and thus spherical trigonometry) play the same fundamental role in solid geometry as triangles (and thus classical trigonometry) in planar geometry [10]. Spherical trigonometry is a tool of outstanding importance in astronomy and navigation on ships or airplanes (however, connections with RLS adaptive filtering had never been made so far!). To see how things are related, notice (see fig.4) that any 3 points on the 3D unit sphere determine: either the unit-length tetrahedron OABC (i.e., length(OA) = length(OB) = length(OC) = 1) - and thus our projection (RLSL) problem; or the spherical triangle ABC - and thus spherical trigonometry.



- figure 4 -

By definition, the spherical triangle ABC consists of the 3 arcs AB, AC and BC of "great circles" obtained by intersecting the 3 planes OAB, OAC, OBC (i.e., which pass through the center O of the sphere) and the sphere. The angle BOC is equal to the length of arc BC and is denoted by a. We call A the dihedral angle between planes OAB and OAC, defined as the plane angle between 2 straight lines orthogonal to OA, and belonging respectively to OAB and OAC. Note that A is equal to the plane angle formed by tangents to the side of the angle at vertex A, and similarly for the remaining angles.

There are 3 degrees of freedom in a spherical triangle: any 3 angles (out of 6) perfectly determine the 3 remaining ones. Consequently, there cannot be more than 3 distinct relationships among the 6 angles. To get one such set, let us now revisit the derivation of (10) as given in the annex (which actually was inspired by [11]), but now considering fig.4 as well as fig.3. $OQ = \cos a$, $OP = \cos b \cos c$, and $(\overrightarrow{HB}, \overrightarrow{OC}) = (\overrightarrow{HB}, \overrightarrow{OQ}) + (\overrightarrow{HB}, \overrightarrow{QC}) = (\overrightarrow{HB}, \overrightarrow{QC}) = \sin b \sin c \cos A$. We just derived the fundamental "law of cosines" of spherical trigonometry:

$$\cos a = \cos b \cos c + \sin b \cos A \sin c \quad (11-a)$$

which thus happens to be equal to the YPII (in the scalar case), through the identification⁶ (12):

$$\begin{aligned} \cos a &\leftrightarrow \rho_Y(C, B) & \cos A &\leftrightarrow \rho_{Y,A}(C, B) \\ \cos b &\leftrightarrow \rho_Y(C, A) & \cos B &\leftrightarrow \rho_{Y,B}(C, A) \\ \cos c &\leftrightarrow \rho_Y(A, B) & \cos C &\leftrightarrow \rho_{Y,C}(A, B) \end{aligned}$$

6 $\forall Y, A, B$, the spectral norm of $\rho_Y(A, B)$ is inferior or equal to 1 [8].

since (11-a) remains valid under permutation of the variables, we get⁷:

$$\cos b = \cos a \cos c + \sin a \cos B \sin c \quad (11-b)$$

$$\cos c = \cos a \cos b + \sin a \cos C \sin b \quad (11-c)$$

In that framework, the angle-normalized RLSL is one particular solution to one of the six "spherical triangle problems" (i.e., determining any 3 angles from the 3 other angles) [12], [13]: "given 2 arcs b and c , plus an angle in-between A , find the third arc a and the two remaining dihedral angles B and C ". To see this, set as above $Y = [y_1, \dots, y_{t-1}]$, and $(A, B, C) = (\sigma, y_{t-1}, y_t)$. At time $t-1$, we know the angles b , c and A (actually their cosines):

$$\cos b = \tilde{e}_{n-1}^t, \quad \cos c = \tilde{\eta}_{n-1}^{t-1}, \quad \cos A = \rho_n^{t-1}$$

We first compute $\cos a = \rho_n^t$ through (11-a) = (1-a), then $\cos B = \tilde{e}_n^t$ and $\cos C = \tilde{\eta}_n^t$ via (11-b) = (1-b) and (11-c) = (1-c), respectively.

A "dual" version of YPII

Now, the formulae of spherical trigonometry [10-13] induce, by analogy, similar formulae among parcors. For instance, consider the 2 great circles having as poles B and C . They intersect in 2 points A' and A'' . Let A' be the point on the same side as A (and similarly for B' and C'). We just defined the so-called "polar triangle" $A'B'C'$ of ABC . In this triangle, the angles a' and A' are equal to $\pi - A$ and $\pi - a$, respectively (and similarly for the other angles); the cosine law reads:

$$\cos A' = -\cos B \cos C + \sin B \cos a \sin C \quad (12)$$

This suggests the following formula among parcors (13):

$$\rho_{r,A}(C, B) = -\rho_{r,B}(C, A) \rho_{r,C}(A, B) + (1 - \rho_{r,B}(C, A) \rho_{r,B}(A, C))^{\frac{1}{2}} \times$$

$$\rho_r(C, B) \times (1 - \rho_{r,C}(B, A) \rho_{r,C}(A, B))^{\frac{1}{2}}$$

indeed, (13) does hold for scalar parcors (A, B and C are $N \times 1$). It is derived by considering once again the proof given in the annex, but now in the "polar tetrahedron" $P_{r,B,C,A}, P_{r,C,A,B}, P_{r,A,B,C}$. Notice that:

$$(P_{r,A,B,C}^{\perp} C, P_{r,C,A,B}^{\perp} B) = (1 - \rho_{r,A}(C, B) \rho_{r,A}(B, C))^{-\frac{1}{2}} \times$$

$$(-\rho_{r,A}(C, B)) (1 - \rho_{r,A}(B, C) \rho_{r,A}(C, B))^{\frac{1}{2}}$$

which reduces to $-\rho_{r,A}(C, B)$ in the scalar case, whence (13).

REFERENCES

- [1] M.Morf, A.Vieira & D.Lee, Ladder forms for identification and speech processing, Proc. 1977 IEEE Conf. D&C, pp. 1074-78, New Orleans, LA, 1977
- [2] D.Lee, Canonical ladder form realizations and fast estimation algorithms, PhD thesis, Stanford university, 1980
- [3] D.Lee, M.Morf & B.Friedlander, Recursive least squares ladder estimation algorithms, IEEE tr. ASSP, v. 29-3, June 81
- [4] T.Kailath, Time-variant and time-invariant lattice filters for non-stationary processes, in : Outils et modèles

7 due to the above remark, any other formula can be deduced from (11-a,b,c). For this reason (11-a,b,c) are often called the fundamental laws of spherical trigonometry.

mathématiques pour l'automatique, l'analyse de systèmes et le traitement du signal, pp. 417-464, Paris, Eds du CNRS, 1982

[5] G.Yule, On the theory of correlation for any number of variables, treated by a new system of notations, Proc. Roy. Soc., vol. 79A, pp. 182-193, 1907

[6] C.Muravchik, M.Morf & D.Lee, Hilbert space array methods for finite rank process estimation and ladder realizations for adaptive signal processing, ICASSP 81, Atlanta

[7] D.Stock, Fast algorithms for fixed-order recursive least-squares parameter estimation, PhD diss., Stanford univ., 1989

[8] B.Porat, B.Friedlander & M.Morf, Square-root covariance ladder algorithms, IEEE tr. AC, vol. 27-4, August 1982

[9] H.Lev-Ari, T.Kailath & J.Cioffi, Least-squares adaptive lattice and transversal filters: a unified geometric theory, IEEE tr. IT, vol. 30-2, pp. 222-236, March 1984

[10] E.G.Kogbeliantz, Fundamentals of mathematics from an advanced viewpoint, Vol 4: solid geometry and spherical trigonometry, Gordon and Breach, New York, 1969

[11] G.Papelier, Eléments de trigonométrie sphérique, 3ème éd., Vuibert, Paris, 1956 (in French)

[12] F.Ayres Jr., Theory and problems of plane and spherical trigonometry, McGraw-Hill, New-York, 1954

[13] L.M.Kells, W.F.Kerns & J.R.Bland, Plane and spherical trigonometry, McGraw-Hill, New York 1951

ANNEX

Let H be the orthogonal projection of B onto \vec{OA} . With the help of fig.2, $\vec{OB} = \vec{OH} + \vec{HB}$ reads (A1):

$$\vec{P}_{r,A}^{\perp} B = P_{r,A}^{\perp} (\vec{P}_{r,A}^{\perp} B) + P_{r,A}^{\perp} (\vec{P}_{r,A}^{\perp} B) = P_{r,A}^{\perp} (\vec{P}_{r,A}^{\perp} B) + P_{r,A}^{\perp} (\vec{P}_{r,A}^{\perp} B)$$

Let us project this decomposition $\vec{OB} = \vec{OH} + \vec{HB}$ onto the third vector \vec{OC} of the tetrahedron:

$$P_{r,C}^{\perp} (\vec{P}_{r,A}^{\perp} B) = P_{r,C}^{\perp} (P_{r,A}^{\perp} (\vec{P}_{r,A}^{\perp} B)) + P_{r,C}^{\perp} (P_{r,A}^{\perp} (\vec{P}_{r,A}^{\perp} B)) \quad (A2)$$

Now, we would like to express the fact that the relationship (A2) among vectors remains valid when considering their length, since \vec{OP} , \vec{OQ} and \vec{PQ} are collinear: $OQ = OP + PQ$ (the sum is algebraic). To that end, let us pre-multiply (A2) by $(\vec{P}_{r,C}^{\perp})^T$. We get (A3-a):

$$(\vec{P}_{r,C}^{\perp})^T \left\{ (\vec{P}_{r,A}^{\perp} B) = (\vec{P}_{r,A}^{\perp} A) (\vec{P}_{r,A}^{\perp} B) + P_{r,A}^{\perp} (\vec{P}_{r,A}^{\perp} B) \right\}$$

Introducing the parcors via (7), (A3-a) becomes (A3-b):

$$\rho_r(C, B) = \rho_r(C, A) \rho_r(A, B) + (\vec{P}_{r,C}^{\perp})^T P_{r,A}^{\perp} (\vec{P}_{r,A}^{\perp} B)$$

To get further, let us consider the orthogonal decomposition $\vec{OC} = \vec{OJ} + \vec{JC}$. The second term of the r.h.s. of (A3-b) can be rewritten as (A4):

$$(C^T P_{r,A}^{\perp})^{-1} \left[C^T P_{r,A}^{\perp} A (A^T P_{r,A}^{\perp})^{-1} A^T P_{r,A}^{\perp} \right] P_{r,A}^{\perp} (\vec{P}_{r,A}^{\perp} B)$$

Since $\vec{HB} \perp \vec{OA}$, the second term in the above inner-product is zero. Thus (A4) reduces to (A5):

$$(C^T P_{r,A}^{\perp})^{-1} C^T P_{r,A}^{\perp} A (A^T P_{r,A}^{\perp})^{-1} A^T P_{r,A}^{\perp} (\vec{P}_{r,A}^{\perp} B)^T$$

where we used fig.2. Using (8), (A5) is rewritten as (A6):

$$(1 - \rho_r(C, A) \rho_r(A, C))^{\frac{1}{2}} \rho_{r,A}(C, B) (1 - \rho_r(B, A) \rho_r(A, B))^{\frac{1}{2}}$$

Gathering (A3-b) and (A6) results in (10).

Copyright © 2002 IEEE — All rights reserved

IEEE HOME | SEARCH IEEE | SHOP | WEB ACCOUNT | CONTACT IEEE

Membership Publications/Services Standards Conferences Careers/Jobs

IEEE Xplore™
RELEASE 1.3

Help FAQ Terms IEEE Peer Quick Links

Review

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

 Print Format

Your search matched 4 of 748173 documents.

Results are shown 25 to a page, sorted by **publication year in descending order**.

You may refine your search by editing the current search expression or entering a new one the te

Then click **Search Again**.

normalization and grid points

Search Again

Results:

Journal or Magazine = JNL Conference = CNF Standard = STD

1 Fuzzy approximation via grid point sampling and singular value decomposition

Yeung Yam

Systems, Man and Cybernetics, Part B, IEEE Transactions on , Volume: 27 Iss

Dec. 1997

Page(s): 933 -951

[\[Abstract\]](#) [\[PDF Full-Text \(936 KB\)\]](#) JNL

2 Singular value-based identification of fuzzy system

Yeung Yam

Decision and Control, 1997., Proceedings of the 36th IEEE Conference on , Vo

1997

Page(s): 3341 -3346 vol.4

[\[Abstract\]](#) [\[PDF Full-Text \(480 KB\)\]](#) CNF

3 A comparison of rotation-based methods for iterative reconstruction algorithms

Di Bella, E.V.R.; Barclay, A.B.; Eisner, R.L.; Schafer, R.W.

Nuclear Science, IEEE Transactions on , Volume: 43 Issue: 6 Part: 2 , Dec. 19

Page(s): 3370 -3376

[\[Abstract\]](#) [\[PDF Full-Text \(148 KB\)\]](#) JNL

4 Comparison of rotation-based methods for iterative reconstruction algorithms

Di Bella, E.V.R.; Barclay, A.B.; Eisner, R.L.; Schafer, R.W.

Di Bella, E.V.R.; Barclay, A.B.; Eisner, R.L.; Schafer, R.W.
Nuclear Science Symposium and Medical Imaging Conference Record, 1995.,
, Volume: 2 , 1995
Page(s): 1146 -1150 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(528 KB\)\]](#) **CNF**

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#)
[Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2002 IEEE — All rights reserved

IEEE HOME | SEARCH IEEE | SHOP | WEB ACCOUNT | CONTACT IEEE

Membership Publications/Services Standards Conferences Careers/Jobs

IEEE Xplore™
RELEASE 1.3

Help FAQ Terms IEEE Peer Quick Links

Review

Welcome to IEEE Xplore™

- ☐ Home
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account

Print Format

Your search matched **6** of **748219** documents.Results are shown **25** to a page, sorted by **publication year** in **descending** order.

You may refine your search by editing the current search expression or entering a new one the te

Then click **Search Again**.

normalization and linear interpolation

Results:Journal or Magazine = **JNL** Conference = **CNF** Standard = **STD**

1 Feature windowing-based Thai text-dependent speaker identification MLP with backpropagation algorithm

Sutat Sae-Tang; Tanprasert, C.

Circuits and Systems, 2000. Proceedings. ISCAS 2000 Geneva. The 2000 IEEE International Symposium on , Volume: 3 , 2000

Page(s): 579 -582 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(352 KB\)\]](#) **CNF**

2 Evaluation of polynomial image deformation using anatomical landm matching of 3D-abdominal MR-images and for atlas construction

Kimiaei, S.; Noz, M.; Jonsson, E.; Crafoord, J.; Maguire, G.Q., Jr.

Nuclear Science, IEEE Transactions on , Volume: 46 Issue: 4 Part: 2 , Aug. 19

Page(s): 1110 -1113

[\[Abstract\]](#) [\[PDF Full-Text \(288 KB\)\]](#) **JNL**

3 Nonlinear shape normalization methods for gray-scale handwritten recognition

Sang-Yup Kim; Seong-Whan Lee

Document Analysis and Recognition, 1997., Proceedings of the Fourth Interna Conference on , Volume: 2 , 1997

Page(s): 479 -482 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(372 KB\)\]](#) **CNF**

4 A comparison of rotation-based methods for iterative reconstruction algorithms

Di Bella, E.V.R.; Barclay, A.B.; Eisner, R.L.; Schafer, R.W.

Nuclear Science, IEEE Transactions on , Volume: 43 Issue: 6 Part: 2 , Dec. 19
Page(s): 3370 -3376

[\[Abstract\]](#) [\[PDF Full-Text \(148 KB\)\]](#) **JNL**

5 Comparison of rotation-based methods for iterative reconstruction algorithms

Di Bella, E.V.R.; Barclay, A.B.; Eisner, R.L.; Schafer, R.W.

Nuclear Science Symposium and Medical Imaging Conference Record, 1995.,
, Volume: 2 , 1995
Page(s): 1146 -1150 vol.2

[\[Abstract\]](#) [\[PDF Full-Text \(528 KB\)\]](#) **CNF**

6 Multiscale image texture analysis in wavelet spaces

Gross, M.H.; Koch, R.; Lippert, L.; Dreger, A.

Image Processing, 1994. Proceedings. ICIP-94., IEEE International Conferenc
Volume: 3 , 1994
Page(s): 412 -416 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(488 KB\)\]](#) **CNF**

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#)
[Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#)
[No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2002 IEEE — All rights reserved